CLAIMS:

1. A signalling system for use with a plurality of series connected battery cells, comprising:

first and second cell signalling devices, each to be powered by a respective one or more of said plurality of battery cells; and

a communication link for connecting an output terminal of said first cell signalling device to an input terminal of said second cell signalling device;

characterised in that at least one of said first and second cell signalling devices comprises a DC level shift circuit which is operable (i) to receive signals transmitted from an adjacent cell signalling device; (ii) to shift the DC level of the received signals; and (iii) to output the level shifted signals for transmission to said communication link.

2. A signalling system according to claim 1, wherein said DC level shift circuit is operable (i) to receive signals from an adjacent cell signalling device which is to be powered by a cell having a higher ground potential than that of the receiving cell signalling device; (ii) to decrease the DC level of the received signals; and (iii) to output the level shifted signals for transmission to said communication link.

3. A signalling system according to claim 1, wherein said DC level shift circuit is operable (i) to receive signals from an adjacent cell signalling device which is to be powered by a cell having a lower ground potential than that of the receiving cell signalling device; (ii) to increase the DC level of the received signals; and (iii) to output the level shifted signals for transmission to said communication link.

4. A signalling system according to claim 1, wherein each cell signalling device comprises at least one sensor input terminal operable to receive a signal from a sensor, which signal is indicative of a condition of the cell or cells which are to power the cell signalling device.

5. A signalling system according to claim 4, wherein each of said cell signalling devices comprises a sensor input terminal operable to receive a signal from an electrolyte level and/or electrolyte pH sensor, which signal is indicative of the electrolyte level and/or the electrolyte pH of the cell or cells which are to power the cell signalling device.

6. A signalling system according to claim 4, wherein each cell signalling device comprises a sensor input terminal operable to receive a signal from a voltage sensor, which signal is indicative of the voltage of the cell or cells which are to power the cell signalling device.

7. A signalling system according to claim 4, wherein each cell signalling device comprises a sensor input terminal which is operable to receive a signal from a temperature sensor, which signal is indicative of the temperature of the cell or cells which are to power the cell signalling device.

8. A signalling system according to claim 4, wherein each cell signalling device comprises a sensor input terminal operable to receive a signal from a voltage interconnection sensor, which signal is indicative of the voltage drop between the cell which is to power said cell signalling device and its adjacent cells.

9. A signalling system according to claim 1, wherein each cell signalling device comprises two of said DC level shift circuits, one of which is operable (i) to receive signals from an adjacent cell signalling device which is to be powered by a cell having a higher ground potential than that of the receiving cell signalling device; (ii) to decrease the DC level of the received signals; and (iii) to output the level shifted signals for transmission to said communication link; and the other one of which is operable (i) to receive signals from an adjacent cell signalling device which is to be powered by a cell having a lower ground potential than that of the receiving cell signalling device; (ii) to increase the DC level of the received signals; and (iii) to output the level shifted signals for transmission to said communication link.

10. A signalling system according to claim 9, wherein said communication link comprises a single wire communication bus, and wherein said two DC level shift circuits lie on two separate data transfer paths which are connectable to said single wire communication bus by a switch.

11. A signalling system according to claim 9, wherein said two DC level shift circuits are located on separate data transfer paths, and wherein said communication link comprises a two wire communication bus for connecting the respective data transfer paths with corresponding data transfer paths of an adjacent cell signalling device.

12. A signalling system according to claim 1, further comprising a central battery monitoring system for monitoring the battery as a whole, and wherein each of said cell signalling devices is operable to communicate,

via said communication link, with said central battery monitoring system.

13. A signalling system according to claim 12, wherein each cell signalling device comprises:

at least one sensor input terminal operable to receive a signal from a sensor, which signal is indicative of a condition of the cell or cells which are to power the cell signalling device; and

a signal generator operable to generate a signal in dependence upon said sensor signal and to output said generated signal for transmission to said central battery monitoring system.

14. A signalling system according to claim 13, wherein said central battery monitoring system is operable to poll each of said plurality of cell signalling devices in turn, and wherein upon being polled, each cell signalling device is operable to return a signal back to said central battery monitoring system via said communication link, which is indicative of said condition of the cell which is to power said cell signalling device.

15. A signalling system according to claim 13, wherein said condition is the cell voltage and wherein said central battery monitoring system is operable to measure the battery charging and discharging current and to calculate the internal resistance of each battery cell by correlating said charging and discharging current with the cell voltages determined by the respective cell signalling devices.

16. A signalling system according to claim 13, wherein said central battery monitoring system is operable to

monitor the battery voltage, the battery temperature, the total battery current and the total level of charge.

17. A signalling system according to claim 1, wherein each of said cell signalling devices is operable to receive a control signal from said communication link and comprises a signal generator operable to generate an actuation signal in dependence upon said received control signal and to output said generated actuation signal for controlling an actuator.

18. A signalling system according to claim 17, further comprising a central battery control system for transmitting said control signal to said communication link.

19. A signalling system according to claim 17, wherein each cell signalling device comprises a sensor input terminal operable to receive a signal from an electrolyte level and/or electrolyte pH sensor, which signal is indicative of the electrolyte level and/or the electrolyte pH of the cell or cells which are to power the cell signalling device, and wherein upon receiving said control signal said cell signalling device is operable to output an actuation signal in dependence upon said sensor signal for controlling the addition of water and acid to the cell in order to control its electrolyte level and/or its electrolyte pH.

20. A signalling system according to claim 17, wherein said actuation signal is for controlling a display.

21. A signalling system according to claim 13, wherein said signal generator comprises a microcontroller which is operable to receive communications from and to

transmit communications to said communication link.

22. A signalling system according to claim 21, wherein the microcontrollers of said signalling devices are independently addressable so that communications can be directed to a selected one or more of said cell signalling devices via said communication link.

23. A signalling system according to claim 22, wherein the microcontrollers of said cell signalling devices are operable to communicate with each other.

24. A signalling system according to claim 1, wherein said DC level shift circuit comprises a comparator.

25. A signalling system according to claim 24, wherein said comparator comprises a voltage comparator.

26. A signalling system according to claim 25, wherein the communications transmitted over said communication link comprise square wave signals, and wherein each of said comparators is arranged to compare said square wave signals with a reference signal which is an approximation of the ground potential of the adjacent cell signalling device which transmitted the received square wave signals and to output a square wave signal in dependence upon whether or not the received square wave signal is greater or less than said reference signal.

27. A signalling system according to claim 24, wherein said comparator comprises a current comparator.

28. A signalling system according to claim 24, wherein alternate voltage to current comparators and current to voltage comparators are used in adjacent cell signalling

devices.

29. A signalling system according to claim 1, wherein said DC level shift circuit comprises a switch and wherein said signalling devices comprises means for opening and closing said switch in dependence upon the signal to be transmitted.

30. A signalling system according to claim 29, wherein said switch comprises a transistor.

31. A signalling system according to claim 30, wherein a source electrode of said switch is connected to a ground potential of one of said first and second cell signalling devices, wherein a drain electrode of said switch is connected to a positive terminal of the other one of said first and second cell signalling devices, wherein said means for opening and closing said switch operates on a gate electrode of the switch in dependence upon the signal to be transmitted to the other cell signalling device and wherein said other cell signalling device comprises means for sensing the change in impedance of said transistor switch.

32. A signalling system according to claim 31, wherein said sensing means comprises a current sensor for sensing the variation of current drawn by said switch as it is opened and closed.

33. A signalling system according to claim 31, wherein said sensing means comprises a voltage divider connected in series with said switch for sensing the change in voltage across the switch as it is opened and closed.

34. A signalling system according to claim 1, wherein

each cell signalling device comprises a DC to DC convertor which is operable to convert the cell voltage of the cell which is to power the cell signalling device, to supply voltages and a ground voltage for powering the cell signalling device.

35. A signalling system according to claim 1, wherein a cell signalling device is provided for each of said series connected battery cells.

36. A signalling system according to claim 1, wherein one or more of said series connected battery cells are connected in parallel with one or more additional battery cells.

37. A cell signalling device for use in a signalling system according to claim 1, comprising:

a power input terminal connectable to the cell or cells which is or are to power said cell signalling device; and

at least one DC level shift circuit which is operable (i) to receive signals transmitted from an adjacent cell signalling device; (ii) to shift the DC level of the received signals; and (iii) to output the level shifted signals for transmission to the communication link forming part of said signalling system.

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38. A signalling kit for use in a signalling system according to claim 1, comprising a plurality of cell signalling devices according to claim 37.

39. A signalling kit according to claim 38, further comprising a communication link for connecting said plurality of cell signalling devices in series.

40. A signalling system according to claim 1 in combination with a plurality of series connected battery cells, wherein one or more of said battery cells are connected to a respective one of said plurality of cell signalling devices, for powering said cell signalling devices.

41. A cell signalling device according to claim 37 in combination with a battery cell, wherein the terminals of said battery cell are connectable to said cell signalling device.

42. A signalling method using a plurality of series connected battery cells, comprising the steps of:

providing a plurality of cell signalling devices and powering them with a respective one or more of said plurality of battery cells;

providing a communication link for connecting said plurality of cell signalling devices in series;

receiving signals transmitted from an adjacent cell signalling device;

shifting the DC level of the received signals; and

outputting the level shifted signals to the communication link.